

Appl. No. 10/523,170  
Reply to Office Action of July 11, 2006

RECEIVED  
CENTRAL FAX CENTER  
OCT 06 2006

REMARKS/ARGUMENTS

A new ABSTRACT is presented hereinabove, as required.

Claim 1 is rejected as fully anticipated by Kurimura et al.  
The other claims are rejected as obvious over Kurimura et al.  
combined with secondary art. Claims 6-16 are canceled. The  
remaining claims depend from claim 1.

Claim 1 is amended to incorporate the following new  
features:

(a) The wavelength converter has quartz type optical fibers  
between the light coupling device and the quasi-phase matched  
quartz crystal as well as after the quasi-phase matched quartz  
crystal.

(b) The quasi-phase quartz crystal comprises an optical  
waveguide with a periodically inverted sign of the nonlinear  
optical constant  $d_{11}$ .

(c) The mode diameter of the quartz type optical fibers is  
substantially the same as the mode diameter of the optical  
waveguide.

Support for (a) can be found, for example, in Fig.2 and  
paragraph [0021] of the original application (paragraph number

Appl. No. 10/523,170  
Reply to Office Action of July 11, 2006

refers to the US publication) or specification paragraph bridging pages 8-9.

Support for (b) can be found, for example, in paragraph [0025] and [0030] of the original application (paragraph number refers to the US publication) or specification page 10, last paragraph and page 12, second paragraph, respectively .

Support for (c) can be found, for example, in paragraph [0030] of the original application (paragraph number refers to the US publication) or specification page 12, second paragraph.

In the invention as now claimed, it is possible to make the mode diameter of the optical waveguide and the mode diameter of optical fiber substantially the same, because the refractive index of the quartz type optical fiber and the refractive index of the quasi-phase matched quartz crystal are very close. As a result, it is possible to reduce connection loss between waveguide and optical fiber and refractive loss. Therefore, it is possible to provide a high efficiency wavelength converter compared with conventional wavelength converters. (As mentioned paragraph [0021] (paragraph bridging pages 8-9), by using conventional material, it is difficult to make mode diameter match, or even if it is possible, refraction loss can not be

Appl. No. 10/523,170  
Reply to Office Action of July 11, 2006

reduced in this situation.)

The merit of combination of quartz type optical fiber and waveguide-type quasi-phase matched quartz crystal was discovered by the inventors and it is not obvious in the art. More specifically, combining the secondary art with Kurimura does not show or suggest this feature.

Kurimura et al. discloses bulk-type quasi-phase matched quartz crystal. However it does not disclose anything about waveguide-type quasi-phase matched quartz crystal. Further, the effects mentioned in Kurimura et al. are different from the above-mentioned effects of claim 1. The wavelength converter of claim 1 is different from quasi-phase matched quartz crystal for ultraviolet wave length converter described in Kurimura et al.

Furthermore, none of the secondary art (Onishi et al., Matsusita et al. and Mizuuchi et al.) disclose or suggest the missing technical features of the invention as claimed. Therefore, combining their teaching with Kurimura does not supply the missing teaching.

The remaining claims depend from claim 1 and are patentable with claim 1.

OCT. 6. 2006 3:16PM

+1-212-319-5101 customer 01933

NO. 0335 P. 9

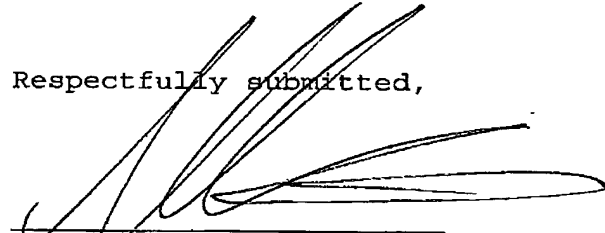
Appl. No. 10/523,170

Reply to Office Action of July 11, 2006

In view of the above, it is submitted that the present invention is not shown or suggested by the cited art. Withdrawal of the rejections and allowance of the application are respectfully requested.

Frishauf, Holtz, Goodman  
& Chick, P.C.  
220 Fifth Ave., 16th Floor  
New York, NY 10001-7708  
Tel. No. (212) 319-4900  
Fax No.: (212) 319-5101  
MJC/lld

Respectfully submitted,

  
MARSHALL J. CHICK  
Reg. No. 26,853